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ABSTRACT

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The First Four Months: Development of Affect, Cognition, and Synchrony

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Abstract

The relation between affective responsiveness, synchrony of mother-infant interaction, and developmental status was examined in 32 normal infants with 8 infants at each age of 4, 8, 12, and 16 weeks. Data were collected in infants' homes and included (1) naturalistic mother-infant play, (2) presentation of auditory, tactile, visual, and social stimuli patterned after Sroufe and Wunsch (1972), and (3) Uzgiris-Hunt and Bayley assessments. Results revealed emerging relations between affect, cognition, and synchrony. Infants of high vs. low synchrony differed in their preference for and variability of responsiveness to varying types of stimuli; synchrony emerged as a possible organizer and facilitator of development. These data suggest that the relation between early affect and cognition may be most meaningfully examined within the context of mother-infant interaction and that further investigation is mandatory, with implications for early infant assessment.

Affect has been documented to occur as early as the neonatal period; for example, Haviland (1975), Wolff (1963, 1973) and Emde, Gaensbauer and Harmon (1976) have investigated early affect and the stimuli and conditions attendant to its appearance. However, most researchers have focused on affect as an index to cognitive processing and typically examine older infants due to the paradigms used. For example, Piaget (1969, 1972), Sroufe and Wunsch (1972), Sroufe and Waters (1976), Kagan (1971), Zelazo and Komer (1971), Zelazo (1972), and Shultz and Zigler (1970) view the smile as a reflection of pleasure associated with cognitive processing. Smiling is viewed as evidence for schemata and demonstration that stimuli are meaningful for the infant.

L. Alan Sroufe and colleagues (Sroufe and Wunsch, 1972; Sroufe and Waters, 1976; Cicchetti and Sroufe, 1975, 1976, 1978; and Sroufe, 1979) have examined the relation of affect to cognitive development in infants 4 months of age and older and have proposed a theoretical framework for affective development. Sroufe and Wunsch (1972) developed auditory, tactile, visual, and social stimuli to elicit laughter. When mothers presented these stimuli, the younger infants laughed more to the auditory and tactile stimuli while the older infants laughed more to the visual and social stimuli. These differences in preference were attributed to developmental changes in cognitive capacity. Therefore, the auditory and tactile stimuli are described as less cognitively-challenging than the visual and social stimuli which are more potent elicitors of affect later in development. The results of subsequent studies (Cicchetti and Sroufe, 1975, 1976, 1978) examining Down's Syndrome infants as well as normals showed similar patterns of results; additionally, they found relations between affect and performance on Uzgiris-Hunt and Bayley assessments. Sroufe and colleagues concluded that there was evidence for an important tie

between cognitive growth and emotional growth and expression. Their findings are consistent with Piaget's (1972) position that affect and cognition evolve in parallel fashion.

Given these results with older infants and the documentation of affective response as early as the neonatal period, it seemed desirable to investigate the relation between affect and cognition in younger infants. Since many researchers (e.g., Stern, 1974) have emphasized the role of mother-infant interaction in shaping infant attention and promoting the development of cognition, interactional synchrony seemed an important additional variable to consider. Synchrony was also considered important because the behavioral repertoire available to the young infant for communicating and interacting with his mother is largely affective in nature. No reported research has specifically addressed the relation of affect to cognition in infants younger than four months; further, no reported research has examined the relation of affective responsiveness to interactional synchrony. The current study, then, explored the interrelation between affective responsiveness, synchrony of mother-infant interaction and infant developmental status in the first four months of life.

It was predicted that auditory and tactile stimuli would be more potent elicitors of affect with younger infants while visual and social stimuli would be more effective with older infants. Increasing linear trends across age were expected for visual and social stimuli while nonlinear trends were expected for the auditory and tactile stimuli. Infants of high synchrony dyads were expected to be more affectively responsive and to have higher scores on the developmental assessments than low synchrony infants. Further, the measures of affect and developmental status were expected to be related.

Method

Subjects and Setting

The sample consisted of 32 normal, healthy infants and their mothers. There were 8 infants (4 male, 4 female) at each age of 4, 8, 12, and 16 weeks. Data were collected in infants' homes with a restriction that all data on any given infant must be collected within a 3 day period. Names for prospective subjects were obtained from birth announcements in the local newspaper.

Procedure

Visits to homes for data collection were made when infants were judged to be well-rested, calm, and alert. The data were collected in three phases. A sample of naturalistic mother-infant play was videotaped to provide a measure of interactional synchrony. Mothers were instructed to position themselves and their infants comfortably and in their usual manner for play; no toys were used. Independent observers rated synchrony of interaction from the videotapes using a method adapted from the coding procedure developed by DeMeis, Francis, Arco and Self (1982). Interactional synchrony was defined as mutual engagement, such as mutual gaze or alternating vocalizations. Each three-second block of the interaction was rated as synchronous or nonsynchronous; a percentage of the number of those blocks spent in synchronous behavior was then computed for each dyad. Percentages were ordered to achieve an equitable distribution of high and low synchronous pairs by sex of the infant and within each age group. There were 8 infants within each age group; therefore, the two lower of the four percentages for males, and likewise for females, were designated low synchrony while the two higher percentages were designated high synchrony. Mean overall interobserver reliability for the synchrony measure was .89. This was computed by dividing the number of agreements by the sum of the agreements plus disagreements.

The second data collection phase consisted of a structured play situation. This structured play situation provided the context for the mother to administer auditory, tactile, visual, and social stimuli to the infant; videotapes of infant responses to the stimuli were scored to provide a measure of affective responsiveness. For this procedure, infants were placed on the floor in an infant seat while the mother positioned herself on the floor near the infant. Prior to beginning the procedure the mother received instructions on the administration of the items: the experimenter modeled the administration of the stimulus items using an empty infant seat for demonstration. However, care was taken to avoid exposure of the items to the infant. When the mother felt comfortable with the procedure, the infant was placed in the infant seat and the camera was focused on the infant. The mother wore a small earphone clipped to her ear through which the researcher softly told her which stimulus item to present, when to start and stop, and provided continual instructions, as needed, to insure similarity of presentation across mothers. Stimuli were derived from Sroufe and Wunsch (1972) and are presented in Table 1. The stimuli were designed such that the auditory, tactile, and visual stimuli all presumably occurred within one modality while the social stimuli were all game-like and comprised of auditory, tactile, and visual components. Stimuli were randomly ordered with a restriction that stimulus type was counterbalanced. In order to ascertain a measure of behavioral change to the stimuli, items were presented such that there was a 5 sec. pre-stimulus period as well as a 5 sec. post-stimulus period for each item; the stimulus period was also of 5 sec. duration.

Infant affective responses (e.g., smiling) were scored from the videotapes by the experimenter and an independent observer. A free-response recording system was used to record any and all infant behaviors; this not only provided a record of ongoing infant behavior but also kept the observer naive regarding

the behaviors of interest. To ascertain behavioral changes, a comparison was made of behaviors occurring during the three stimulus phases. Any pertinent behavior which occurred during the stimulus but had been present during the pre-stimulus period was excluded since that behavior was likely an instance of ongoing behavior rather than behavioral change to the stimulus presentation.

After the pertinent behaviors had been extracted from the data, they were then sorted into one of three categories: positive, attentive, or negative (See Table 2). By definition, a pertinent behavior had to logically fit into one of the categories. The behaviors were each assigned a numerical value of one and summed within category for each stimulus presentation; the number above each category was then added to the appropriate sum as a constant to provide numerical separation of categories, with positive affect receiving the largest weighting. Scores were then summed across category for each stimulus presentation. The sum of scores within stimulus type--auditory, tactile, visual, and social--then became the dependent measure of affective response. Mean overall interobserver reliability for the affective measure was .97; this was computed in the same way as the synchrony reliability measure.

Finally, the Bayley Motor and Mental Scales of Development (Bayley, 1969) and the Uzgiris-Hunt Scales of Psychological Development (Uzgiris and Hunt, 1975) were administered to each infant by the researcher to provide measures of developmental status. An independent observer scored assessments with the researcher as often as possible but reliability measures were not obtained for every assessment.

Since standardization data for scoring the Bayley Scales are not provided for infants under 2 months, raw scores were used for analysis. Sensorimotor substages were computed for each of the six Uzgiris-Hunt Scales and then

averaged to yield a mean substage score. Mean interobserver reliability was .95 (N = 21) for the Bayley Motor Scale, .96 for the Bayley Mental Scale (N = 22), and .94 (N = 22) for the Uzgiris-Hunt Composite Score, computed as for the earlier measures.

Results

Several types of analyses were performed on the data: multivariate and univariate analyses of variance, trend analysis and principal components analysis. The assessment measures were analyzed via MANOVA with synchrony, sex, and age as between factors in a completely crossed design. Results revealed that scores on each assessment significantly increased across age; no other variables significantly influenced the measures.

An ANOVA was performed on the affective measure with synchrony, sex, and age as between factors and stimulus type as a within factor. Stimulus type was significant as was the stimulus type by synchrony interaction. Subsequent analyses using the Tukey HSD procedure (Kirk, 1968) revealed that low synchrony infants showed much variability in responsiveness among stimuli, with marked preference for auditory stimuli. In contrast, high synchrony infants showed a preference for social stimuli over visual but were otherwise markedly stable in responsiveness (See Table 3).

An analysis of trend of affective responsiveness to types of stimuli across age revealed a linear trend for tactile stimuli and cubic trends for auditory and visual stimuli. Response to social stimuli showed no trend, remaining somewhat stable across age (See Table 4). It is interesting to note the contrast in Figure 1 between responses to the multimodal social stimuli and those to the unimodal auditory, tactile, and visual stimuli. Responding to social stimuli is stable across age in comparison to other types of stimuli for both high and low synchrony infants. However, high synchrony infants

responded more to social stimuli than low synchrony infants at all ages; this nonoverlapping of responding by high and low synchrony groups was not shown to any other types of stimuli. Also notable is the tendency for high synchrony infants to show similar patterns of decreasing responsiveness over development to all the unimodal stimuli; the pattern of responsiveness across stimuli is not consistent for low synchrony infants.

Finally, a principal components analysis was used to summarize the structure of the interrelation of the variables. Results revealed an unusually clear, orthogonal solution with three factors: (1) cognitive development, comprised of age and assessment measures, (2) affective responsiveness to presentation of sensory (auditory, tactile, and visual) stimuli and (3) sociability, comprised of measures of synchrony of mother-infant interaction and affective responsiveness to presentation of social stimuli (See Table 5).

Discussion

The findings of the current study suggest that the relations between affect, cognition, and synchrony are complex but are apparent in the first four months of life. Current formulations of affective development, however, do not adequately describe this early period.

The importance of stimulus type in influencing affective repsonsiveness was supported throughout the current data. Patterns of responsiveness suggest that there are indeed similarities shared by auditory and tactile stimuli as distinct from those shared by visual and social stimuli. However, the data also suggest that another important stimulus attribute may be whether a stimulus is unimodal or multimodal; the auditory, tactile, and visual stimuli all presumably occurred within one modality while the social stimuli were all multimodal. This may account for the distinctive pattern of responding to

the social stimuli in contrast to the other types of stimuli. Alternatively, perhaps the stimulus situation somehow altered responding. Arco and McCluskey (1980) found that even minor manipulations of mother-infant interaction produced significant changes in infant responding. Additionally, Cicchetti and Sroufe (1975, 1976) noted that their Down's Syndrome subjects were all observed to laugh at home during informal observations but seldom laughed in the testing situation. Sroufe, Waters and Matas (1976) have also noted the importance of context in influencing affective response. Social stimuli thus may elicit a distinctive pattern of response as a result of their naturalistic character. This suggests the necessity of examining infant affect within the context of mother-infant interaction. The consistently higher responsiveness of high synchrony infants to social stimuli mandates attention to the character of that interaction as well.

Evidence for the importance of synchrony in the present research is clear; high and low synchrony infants show differences not only in their preferences for different types of stimuli but in other aspects of responsiveness as well. High synchrony infants prefer more complex, multimodal social stimuli while low synchrony infants prefer unimodal stimuli, particularly auditory stimuli. (Within Sroufe's framework these high synchrony infants would be viewed as preferring more cognitive challenge in comparison to their low synchrony counterparts.) High synchrony infants show less variability in responding among different types of stimuli in comparison to low synchrony infants. Additionally, high synchrony infants show similar patterns of decline in responsiveness to unimodal stimuli across age while no consistent pattern is apparent for the low synchrony infants. Horowitz (1969) noted that perhaps infant responding may initially be more variable, becoming more stable over development. If there is such a developmental progression, then the high

synchrony infants in the current sample would be more developmentally "advanced." The relation between affect and assessment measures Sroufe and colleagues have documented in older infants was not apparent in these very young infants; however, relations between affect and developmental status may be suggested in the differences between high and low synchrony infants. Perhaps synchrony may serve to organize behaviors and facilitate development. Regardless of the role future research may define for synchrony, it seems imperative that future investigations must examine its influence on early affect and cognition.

In conclusion, the current findings suggest that there are emerging relations between affect, cognition, and synchrony of mother-infant interaction in the first four months of life. Synchrony seems to be a crucial variable in any examination of affective development; additionally, it is essential that future research examine affective responsiveness within the context of mother-infant interaction. Future studies of affective development must clarify the role of infant affect in mother-infant interaction and how these variables interact with cognitive growth in earliest infancy. The consequences of the infant's affect within social interaction may be crucial for development. Further, it is likely that the earliest days are the most crucial in that regard since early patterns of interaction may influence later interaction (Klaus and Kennel, 1976).

Delineation of the relations between affect, cognition, and synchrony will provide basic information on infant development; it will also hold implications for assessment. Affective responsiveness may provide an additional approach to assessing infant development as well as the quality of mother-infant interaction. It is surprising that the importance of early infant affect as a developmental phenomenon has not received more attention. As Bowlby (1958) perceptively noted, "Can we doubt that the more and better an infant smiles the better he is cared for?"

References

Bayley, N. Manual for the Bayley Scales of Infant Development. New York: Psychological Corporation, 1969.

Bowlby, J. The nature of the child's tie to his mother. International Journal of Psychoanalysis, 1958, 39, 350-373.

Cicchetti, D. and Sroufe, L. The relation between affective and cognitive development in Down's Syndrome infants. Paper presented at the meeting of the Society for Research in Child Development, Denver, 1975.

Cicchetti, D. and Sroufe, L. The relationship between affective and cognitive development in Down's Syndrome infants. Child Development, 1976, 47, 920-929.

Cicchetti, D. and Sroufe, L. An organizational view of affect: Illustration from the study of Down's Syndrome infants. Unpublished Manuscript, 1978.

DeMeis, D., Francis, P., Arco, C. & Self, P. Theoretical and methodological perspectives in early social interaction. Manuscript in preparation, Hobart and William Smith College, Geneva, New York, 1982.

Emde, R., Gaensbauer, T. and Harmon, R. Emotional expression in infancy: A biobehavioral study. Psychological Issues: Vol. X, No. 1, Monographs 37. New York: International Universities Press, 1976.

Haviland, J. Individual differences in affect. Paper presented at Meeting of Society for Research in Child Development, Denver, April, 1975.

Horowitz, F. Learning, development research and individual differences. In Lipsitt, L. and Reese, W. (Eds.), Advances in child development and behavior, Vol. 4, New York: Academic Press, 1969.

Kagan, J. Change and continuity in infancy. New York: John Wiley and Sons, 1971.

Kirk, R. Experimental design: Procedures for the behavioral sciences. Belmont, California: Brooks/Cole Publishing Company, 1968.

Klaus, M. and Kennel, J. Maternal-infant bonding. St. Louis: Mosby, 1976.

Piaget, J. and Inhelder, B. The psychology of the child. New York: Basic Books, 1969.

Piaget, J. The relation of affectivity to intelligence in the mental development of the child. In Harrison, S. and McDermott, J. R. (Eds.), Childhood psychopathology. New York: International Universities Press, Inc., 1972.

Shultz, T. and Zigler, E. Emotional concomitants of visual mastery in infants: The effects of stimulus movement on smiling and vocalizing. Journal of Experimental Child Psychology, 1970, 10, 390-402.

Sroufe, L. and Wunsch, J. The development of laughter in the first year of life. Child Development, 1972, 43, 1326-1344.

Sroufe, L., Waters, E. and Matas, L. Contextual determinants of infant affective response. In Lewis, M. and Rosenblum, L. (Eds.), The origins of behavior, Vol. 2, Fear. New York: John Wiley and Sons, 1974.

Sroufe, L. and Waters, E. The ontogenesis of smiling and laughter: A perspective on the organization of development in infancy. Psychological Review, 1976, 83, 173-189.

Sroufe, L. Socioemotional development. In Osofsky, J. (Ed.), Handbook of infant development. New York: John Wiley and Sons, 1979.

Stern, D. Mother and infant at play: The dyadic interaction involving facial, vocal and gaze behaviors. In Lewis, M. and Rosenblum, L. (Eds.), The effect of the infant on it's caregiver. New York: John Wiley and Sons, 1974.

Uzgiris, I. and Hunt, J. Assessment in infancy: Ordinal scales of psychological development. Urbana: University of Illinois, 1975.

Wolff, P. Observations on the early development of smiling. In Foss, B. (Ed.), Determinants of infant behavior, II. London: Methusen, 1963.

Wolff, P. Observations on newborn infants. In Stone, L., Smith, H. and Murphy, L. (Eds.), The competent infant. New York: Basic Books, Inc., 1973.

Zelazo, P. and Komer, M. Infant smiling to nonsocial stimuli and the recognition hypothesis. Child Development, 1971, 42, 1327-1339.

Zelazo, P. Smiling and Vocalizing: A cognitive emphasis. Merrill-Palmer Quarterly, 1972, 18, 349-365.

Table 1

Stimulus Items

Auditory	Tactile
bell	blow gently across forehead
rattle	tickle chin with finger
"Hi baby, how are you?"	tickle tummy/chest with soft cloth
Visual	**Social**
soft light across visual field	peek-a-boo
toy into visual field	pat-a-cake
disappearing-reappearing toy (behind small white piece of paper)	I'm gonna get you

Table 2

Categories of Affective Response

25	15	5
Positive	Attentive	Negative
Brightening	Brow Knit	Frown
Smile	Attentive	Whimper
Active Smile*	Sober	Withdrawal
Laughter	Freezing	Crying

*with motor activity

Table 3
Significant Differences in Affective Responsiveness Between Types of Stimuli as a Function of Synchrony (using Tukey's Comparison Method)

	Stimulus Type			
Auditory	Auditory	Tactile	Visual	Social
Low Synchrony				
High Synchrony				
Combined				
Tactile				
Low Synchrony	3.16**			
High Synchrony				
Combined	4.98**			
Visual				
Low Synchrony	4.92**			
High Synchrony				
Combined	6.93**			
Social				
Low Synchrony	2.85**			
High Synchrony			2.92*	
Combined		2.70*	4.65**	

*p < .05
**p < .01

Table 4

Significant Trends in Mean Affective Responsiveness to Types of Stimuli As a Function of Age

	Stimulus Type			
Age in Weeks	Auditory**	Tactile*	Visual**	Social
4	63.37	22.62	35.75	72.00
8	119.00	61.25	46.87	63.62
12	71.37	53.62	19.25	65.37
16	81.87	58.50	38.00	73.00

*linear trend
**cubic trend
(all p values < .05)

Table 5

Principal Components Analysis

Varimax Rotated Factor Matrix

	Components		
Measure	Cognitive Development	Affective Responsiveness to Sensory Stimuli	Sociability
Age	.97*	.05	.01
Synchrony	.19	-.13	.87*
Bayley Motor	.93*	-.07	-.05
Bayley Mental	.97*	.02	.13
Uzgiris-Hunt	.91*	.11	.11
Auditory Stimuli	-.01	.88*	-.13
Tactile Stimuli	.32	.79*	-.07
Visual Stimuli	-.16	.77*	.37
Social Stimuli	-.06	.48	.56*

*Entries greater than .50

Figure 1
Affective Response to Various Types of Stimuli Across Age